

## **REMARKS**

The Office Action of June 16, 2005, is discussed in detail below.

### **Amendments to the Specification**

Applicant has corrected a typographical error that appears in the paragraph beginning on line 13 of p. 15.

### **Amendments to the Claims**

Applicant has amended claim 1 to recite that the atomic aggregations are catalytic, that the atomic aggregations consist essentially of one or more metal atoms, and that the quantum limit atomic aggregations lack a metallic band structure. Support for this amendment can be found in Examples 1 – 4 (which show examples of catalytic atomic aggregations according to the instant invention that consist essentially of one or more metal atoms) and on p. 20, line 4 – p. 21, line 21 of Applicant’s specification. (p. 20, lines 6-9: “Extended metal-metal bonding and the formation of a metallic band structure are bulk characteristics of existing hydrogen storage alloys that influence the potential wells of hydrogen storage sites. A metallic band structure is the result of the metallic bonding that occurs when a bulk ensemble of metal atoms comes together to form a solid.”; p. 20, line 21 – p. 21, line 7: “In order to reduce the number of metal atoms that influence a particular hydrogen storage site, the instant inventors have reasoned that it is necessary to disrupt the metallic bonding that is characteristic of the hydrogen storage sites of existing hydrogen storage alloys. Since metallic bonding is a

consequence of extended metal-metal bonding over macroscopic length scales, the instant inventors have further reasoned that a reduction in the number of atoms influencing or surrounding a hydrogen storage site provides a new degree of freedom in controlling the binding energy of hydrogen storage sites. More specifically, if the number of atoms can be reduced to the extent that bulk properties are not manifest, then the extended metal-metal bonding required for metallic bonding cannot occur and the electron density at a hydrogen storage site is reduced. The binding energy of the site can therefore be reduced.”; p. 21, lines 11-16: “The instant materials are comprised of an assembly of atomic aggregations having length scales in the quantum regime. The quantum regime is a sub-macroscopic regime characterized by atomic aggregations having length scales on the order of a few angstroms to several tens of angstroms. The quantum limit corresponds to a unique state of matter having electronic, chemical, physical or other properties not found in the macroscopic limit.”

Applicant has canceled claims 2, 3, 9 and 10.

Applicant has added new claim 19 that recites that the catalytic atomic aggregations consist essentially of atoms of two or more different elements. This claim is directed at the embodiment of Applicant’s invention in which the inventive quantum limit catalyst is an alloy. Support for this claim can be found, for example, on p. 30, lines 13 -14 of Applicant’s specification (“Single element as well as multi-element atomic aggregations in the quantum limit are within the scope of the instant invention.”)

### **Claim Rejections**

**From Paragraph 2 of the Office Action dated June 16, 2005:**

**Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stiles (US Pat. 3,317,439).**

Applicant's amended claim 1 recites catalytic atomic aggregations that consist essentially of one or more metal atoms, where the atomic aggregations lack a metallic band structure. Applicant recognizes that Stiles (col. 3, lines 70 – 75) teaches catalytic materials consisting essentially of metal atoms, but maintains that Stiles provides no teaching that their catalytic aggregations of metal atoms lack a metallic band structure. Since Stiles fails to teach each and every element of Applicant's amended claim 1, Applicant respectfully submits that this objection has been overcome and that Applicant's invention is patentable over Stiles. Consequently, Applicant respectfully requests allowance of the outstanding claims.

## **SUMMARY**

The remaining claims in the application are Claims 1, 4 – 8, and 11 – 18. In view of the present amendment, applicant believes that all remaining claims are allowable over the Stiles reference cited by the Examiner. Applicant believes that the application, as presently amended, stands in a condition of allowance and respectfully requests withdrawal of the outstanding rejections. If the Examiner has any questions or suggestions regarding this amendment, he is respectfully asked to contact applicant's representative at the telephone number or email address listed below.

Respectfully submitted,



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